

Coasting Along

WebQuest Description: In this web quest students will gather and analyze information about roller coasters in order to calculate their velocity over certain intervals and create their own roller coaster.

Grade Level: 9-12

Curriculum: Math

Keywords: Roller Coaster, Algebra 1, Physics, Distance vs Time, Slope

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Introduction

A new amusement park is being created in your town and your team has been selected as engineers to design a roller coaster. A roller coaster is a type of amusement ride that utilizes a form elevated elevated railroad tracks designed with tight turns, steep slopes and sometimes inversions. You will work in your team to research roller coasters around the world to gather information on roller coasters in order to design and create your own roller coaster.

Tasks

In this project you will research roller coasters at roller coasters at various amusement parks and gather information in order to design your own roller coaster. To successfully complete this project you will need to create a presentation that will include Research gathered (history, safety requirements materials, etc.) An in depth look at five roller coasters Scale drawings, distance vs time graphs, slope calculation and interpretation of one coaster Scale drawings, distance vs time graphs, slope calculation and interpretation of your own coaster Scale model of your coaster

Process

Process 1: Gather research on roller coasters and complete the research response sheet. <http://www.aceonline.org/CoasterHistory/> <http://science.howstuffworks.com/engineering/structural/roller-coaster.htm> <http://www.unitedstreaming.com/videos/dsc/externalApplications/interactiveVideos/index.html?vid=12R> <http://www.britannica.com/topic/roller-coaster> <http://www.kidzworld.com/article/4633-how-roller-coasters-work> <http://www.learner.org/interactives/parkphysics/parkphysics.html> <http://discoverykids.com/games/build-a-coaster/> <http://www.fearofphysics.com/Roller/roller.html> <http://pbskids.org/fetch/games/coaster/index.html> Process 2: Use the links above (and any others that you find) to research the science and math behind roller coasters. Complete the response sheet and the calculations work sheet Process 3: Find information about any five roller coasters and complete the information sheet Process 4: Watch the scale drawing tutorial then complete the Quizizz assignment about scale drawings Process 5: Choose one roller coaster to analyze. Create a scale drawing and include a key Process 6: Watch the interpreting slope video then complete the Slope Stories activity that involves matching graphs with stories Process 7: Create a roller coaster using the roller coaster game link from below. Create a scale drawing of your roller coaster. Be sure to include a key. Answer the questions about your coaster. Then create a distance versus time graph of your roller coaster Process 8: Create a presentation to display the information from processes 1-7. Refer to the evaluation tab for the rubric. Create a scale model of your roller coaster.

Evaluation

The attached rubric explains the scoring process for this WebQuest. Review the rubric constantly while completing your your task to ensure that you have addressed all aspects of the WebQuest.

Category and Score					Score
				Total Score	

Conclusion

Congratulations engineers and mathematicians! By successfully designing and creating your own roller coaster, have mastered numerous tasks that should make each of you proud. These tasks include: working as a team, researching and collecting data/information, applying your research to real world situations and presenting your research. I'm sure the rest of the Amusement Park Design Team will be happy with your contribution!

Teacher Page

In this WebQuest students will apply concepts that they have learned in Math and Science to research and design roller coasters

Standards

Common Core Math Standards
CCSS.MATH.CONTENT.HSF.IF.A.2 Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
CCSS.MATH.CONTENT.HSF.IF.B.4 For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.
*CSS.MATH.CONTENT.HSF.IF.B.6 Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph
Next Generation Science Standards
MS-PS3-1 Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.
MS-PS3-2 Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system.
MS-PS3-5 Construct, use, and present arguments to support the claim that when the motion energy of an object changes, energy is transferred to or from the object.

Credits

I would like to thank the faculty Prince George's Community College and the Maryland Center at Bowie State University for their guidance in creating this WebQuest.

Other